A.D. 1822 . . . . N° 4646.

SPECIFICATION

OF

GEORGE HOLWORTHY PALMER.

HYDRAULIC BLOWING MACHINE, APPLICABLE TO FURNACES OF STEAM ENGINES, AIR FURNACES, &c.

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Hydraulic Blowing Machine, applicable to Furnaces of Steam Engines, Air Furnaces, &c.

PALMER'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, George Holworthy Palmer, of the Royal Mint, Engineer, send greeting.

WHEREAS His most Excellent Majesty King George the Fourth, by His Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Twelfth day of February, in the fourth year of His reign, did, for Himself, His heirs and successors, give and grant unto me, the said George Holworthy Palmer, His especial licence, that I, the said George Holworthy Palmer, my executors, administrators, or assigns, or such others as I, the said George Holworthy Palmer, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England and Wales, and the Town of Berwick upon Tweed, my Invention of "Certain Improvements in the Production of Heat, by the Application of well-known Principles not hitherto made use of, in the Construction of Furnaces of Steam Engines, and of Air Furnaces in general, whereby a considerable Saving in the Expenditure of Fuel is obtained, and the total Consumption of Smoke may be effected;" in which said Letters Patent there is contained a proviso, obliging me, the said George Holworthy Palmer, by an instrument in writing under my hand and seal, particularly to describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, and to cause the same to be inrolled in His Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

NOW KNOW YE, that in compliance with the said proviso, I, the said George Holworthy Palmer, have executed this instrument, by which I do declare that the nature of my said Invention, and the manner in which the same is to be used and put in practice, are particularly described and ascertained in manner following (namely):—

My said improvements consist in the invention, use, and employment of a new hydraulic rotative machine for the purpose of blowing air upon or exhausting it from the burning fuel in furnaces, and also consist, independently of the machine, in a new mode of creating a draft through a furnace, or of applying air to burning fuel in a steady uniform blast of any required strength, and to any part or parts of the furnace. My new hydraulic rotative machine consists of three distinct parts.

First, a cast-iron tank or cistern containing a sufficient quantity of water and made air and water tight everywhere but at the top, where it communicates with the external air by means of a pipe.

Secondly, a wheel or blower made of sheet iron, copper, or tin plate, and containing three or more curved air conductors alternately over-wrapping each other, and arranged about the circumference of the wheel, with the axis of which they are connected by iron arms. The space between the axis of the blower and the air conductors is partly filled with water, and that part of it which is above the water is called the chamber. The blower or wheel is placed vertically in the tank with its axis below the level of the water, and there are openings in the centre of the blower on each side, affording a free communication between the water and the tank, and that which is within the blower.

Thirdly, an elbow air pipe which opens into the chamber of the blower as high as conveniently above the level of the water, and passing through the side of the tank, in such a way as not to obstruct the revolution of the blower, proceeds to the furnace. The blower may be made to revolve by the hand or by any of the usual contrivances for the like purpose, and according to the direction in which the rotation is made to take place, the machine will act as a condensing or an exhausting machine. The annexed Figure represents a vertical section of the machine, and various modes in which the air pipe may be connected with the furnace, and by reference to it the construction and action of the apparatus will be clearly explained. M is the machine; A, A, A, the tank, filled with water to the level; *v*, *w*, is a pipe opening from the upper part of the tank to the external air; *a*, *a*, *a*, the air conductors arranged about the circumference of the blower. By means of the openings from the center of the blower to the tank, the water, when the machine is at rest, is at the same level in the tank and in the blower. Q, the space above the water in the blower is the chamber. B, B, B, B, is the elbow air pipe, having its opening into the upper part of the chamber sheltered by a cap or hood, which protects it from the drippings of water from the air conductors as they revolve. If the blower be turned in the direction of the arrows, the machine acts as a condenser and blower, for as each conductor enter the water in the tank at *v*, its other extremity escapes from the water at *x*, and the body of air which it contained is forced into the chamber, and there condensed until the condensation impels a current into the pipe B, and the like process taking place as each conductor successively enters the water, a constant and uniform blast is sustained, and in proportion to the velocity of the rotation the strength of the blast will be increased. If the blower be turned in a contrary direction the machine acts as an exhauster and pump, for as each conductor escapes from the water at P, it is filled with air from the chamber, and, being so filled, as the conductor again enters the water at *x*, the same air is forced out at the other end of the conductor, and begins to be delivered into the tank at *v*, and by this means the quantity of air in the chamber is exhausted by the amount so conveyed away. The deficiency is immediately supplied by a current of air which enters the chamber through the pipe B, and the like process being repeated as each conductor successively escapes from and returns to the water, a continual exhaustion or suction is preserved, and thereby a continual current of air is forced into the chamber from the pipe B, and in proportion to the velocity of the rotation, the strength of the suction and consequent current of air is increased. The air pipe B is continued to the furnace, and by making it proceed in different directions, as through the branches I or L, represented in the Figure, it may be made to go to such part or parts of the furnace as may be made to go to such part or parts of the furnace as may be most convenient; and when the machine is employed as a condenser or blower, it will inject any given or desired quantity of air into the furnace in a steady regulated blast by any number of openings, which may be of any form or size. The opening or openings into the furnace may enter either in front, at the side, on the bridge, or underneath the fire bars, reserving in the latter case the greatest proportion of the fire bars for the entrance of air in the usual way, but the mode of application must be determined by the form and extent of each particular furnace to which this machine and contrivance may be applied. And it is to be observed that if the air pipe is made to enter the furnace underneath the fire bars, as in the direction L in the Figure, the pipe ought to be made to terminate in a box or air chamber, which in the Figure is represented at C. The top of this box forms one of the fire bars with an aperture running its whole length to admit the air to pass through into the furnace; the bottom of the box is furnished with an air-tight door at 2, to let out the cinders and ashes which fall from the furnace. At the first firing of the furnace, and until the natural draft operates to admit air through the fire bars to inflame the smoke, there is a very imperfect combustion, and consequently a great loss of fuel. It is at this time that my machine used as a blower is particularly useful; if put in motion and turned with sufficient velocity, it will supply air enough to consume all the smoke. Moreover, every furnace to which my machine is applied as a blower becomes a compound furnace, being supplied with air from two independent sources; first, in the usual way through the fire bars; and secondly, by injection through the machine; and by these means all the combustible products are so completely ignited that the heat obtained will be in direct proportion to the quantity of fuel consumed. The rapid evolution of heat is ascertained by the effects produced, and the complete combustion of the combustible products appears from the absence of soot and smoke from the flues and chimney. It is obvious that one machine may be employed as a blower for more furnaces than one by opening and cutting off the communications from the pipe B by cocks; when the machine is employed to act by exhaustion or as a pump, the air pipe ought to be made to communicate with the extremity of the furnace, which is beyond the part in which the heat is required to be expended, as in the Figure. The pipe B ought to be continued in the direction E, E, E, to meet the back part of the furnace, and no other branch ought then to communicate with the furnace. The machine being then turned in the direction which produces exhaustion, a current of air in the direction E, E, B, is immediately excited, and this current being supplied from the furnace, and from the external air through the fire bars, a constant and rapid draft through the furnace is created. The consumption of the ignitable products of burning fuel is greatly increased, and the elastic fluids which do not ignite pass through the pipe B into the chamber of the blower, and thence through the air conductors into the upper part of the tank, from whence they might be suffered to escape into the external air through a simple pipe, as at the top of D in the Figure. But when the machine is employed in this way it sometimes happens that the smoke is not entirely consumed at the first lighting of the fire, for want of sufficient degree of heat; to remedy this inconvenience, the exit pipe in the upper part of the tank may be made to pass on to a vessel of water in which the unconsumed smoke, if any, will be deposited as in the Figure, for the pipe K, at the end is connected to a wash plate which terminates in the vessel F, which vessel is filled with

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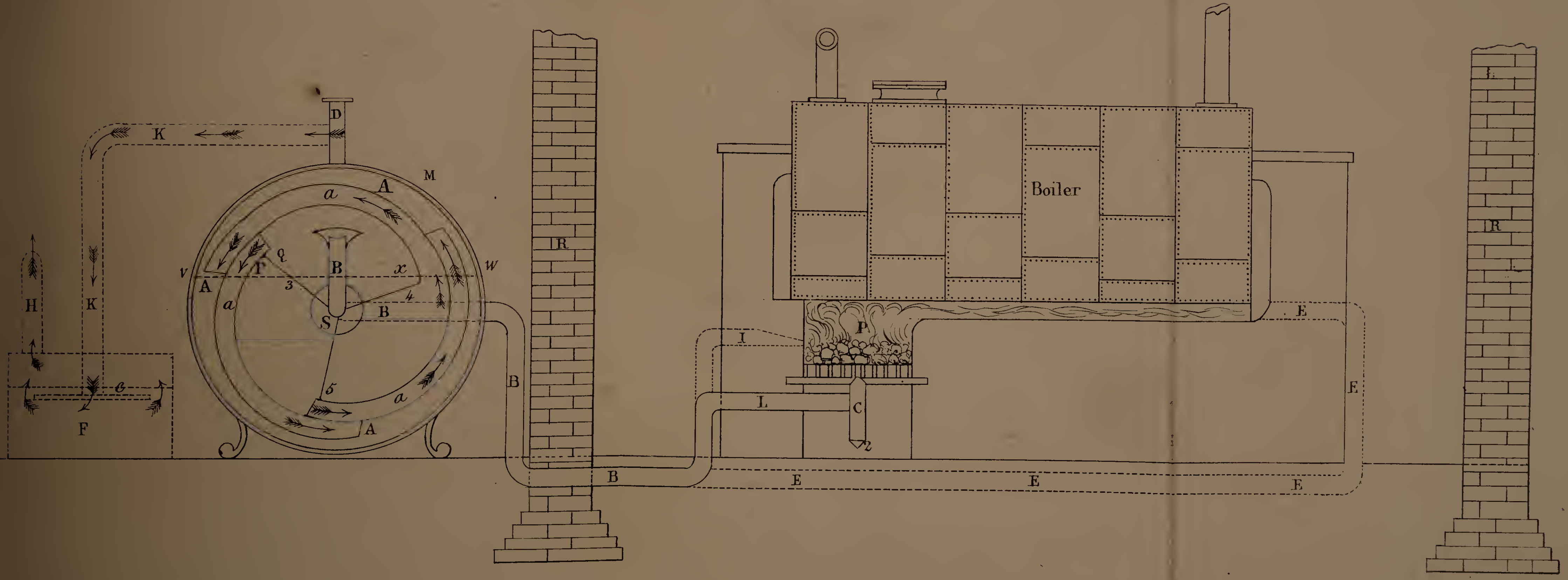
PALMER'S SPECIFCATION.

(1 SHEET.)

Vertical Section of the Hydraulic Condensing and Exhausting Apparatus, shewing the various modes of connecting the Pipes to the Furnaces.



The Enrolled drawing is partly colored

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water up to the dotted line *e*, about one inch above the wash plate, and the elastic fluids passing along the pipe K to the water box F, and blowing through the water finally escape along the pipe H free from any smoke, and in this way the smoke of furnaces may be intirely suppressed without resorting to lofty chimneys. Whether the condensing or exhausting process is employed to ignite the smoke or steam engine, retort furnaces, or the furnaces of sugar bakers pans, &c., the furnace may be fed with fuel by the stoker in the usual way, or by the introduction of a hopper. My new hydraulic rotative machine may be made of different sizes adapted to the magnitudes of the furnaces to which it is to be applied. If the blower be made with a diameter of about five feet and a half, and a width about two feet and a half, and the conductors are made about four inches deep, the power of the machine will be found sufficient for general purposes.

In witness whereof, I, the said George Holworthy Palmer, have hereunto set my hand and seal, the Twelfth day of August, in the year of our Lord One thousand eight hundred and twenty-two.

G. H. PALMER.

Signed, sealed, and delivered by the within-named George Holworthy Palmer (being first duly stamped) in the presence of

Saml Amory,
25, Throgmorton Street.
Benjn Skillman,
Clk. to Messrs. Amory & Coles.

AND BE IT REMEMBERED, that on the same Twelfth day of August, in the year above mentioned, the aforesaid George Holworthy Palmer came before our Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and everything therein contained, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute in that case made and provided.

F. Cross.

Inrolled the same Twelfth day of August, in the year above written.

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